racy of assembly **100** may be greatly improved over known force-based touch sensor assemblies.

[**0056**] In some applications, multiple types of capacitive devices using features of the present invention may be used. For example, capacitive device **200** may be used in a force-based sensor assembly, such as assembly **100**, to determine the location of an intended applied force. In addition, accelerometers having a structure similar to capacitive device **300** may be positioned adjacent each of the devices **110**, **112**, **114**, **116** to identify unintentional applied forces to the assembly **100** so that those unintentional forces can be accounted for and eliminated when determining the location of an intended applied force. The capacitive devices of the present invention may also be used in a variety of other applications, such as testing and laboratory equipment, or may be used in force sensing touch panels such as those disclosed in International Publications WO 02/984580, WO 02/084579, WO 02/084578, and WO 02/084244, each of which are wholly incorporated into this document.

[**0057**] The configuration of capacitive device **300** may be particularly useful as an accelerometer. This type of configuration would most likely be useful for measuring acceleration in only a single direction or plane because of the orientation of the first electrode relative to the second electrode. In one embodiment, an accelerometer having a configuration similar to device **300** may be used in a system that also includes a capacitive force-based device similar to capacitive device **200**. In such a system, it may be useful to position multiple accelerometers throughout the system with various orientations so forces acting upon the system can be identified. For example, a force-sensing touch screen may use accelerometers to detect forces unrelated to a touch input so that such forces can be subtracted when determining actual touch position. In some embodiments, it may also be useful to require that all accelerometers (such as devices **300**) and force-based devices (such as devices **200**) in the system use the same structured elements.

[**0058**] The above specification, examples and data provide a complete description of the manufacture and use of the composition of the invention. Since many embodiments of the invention can be made without departing from the spirit and scope of the invention, the invention resides in the claims hereinafter appended.

We claim:

1. A capacitive device configured to detect differences in an applied force over a continuous range of applied force including zero force, the device comprising:

first and second electrodes, the electrodes being spaced apart a predetermined distance from each other in a rest position, a measurable capacitance existing between the first and second electrodes;

structured elements having a predetermined maximum dimension positioned to control the predetermined distance between the first and second electrodes;

whereby the applied force causes a change in the distance between the first and second electrodes and a related change in the capacitance that can be measured to determine information related to the applied force.

2. The device of claim 1, wherein the first and second electrodes are mounted to a substrate.

3. The device of claim 2, wherein the first electrode comprises a rectangular plate having first and second ends.

4. The device of claim 2, wherein the structured elements are positioned between the first electrode and the substrate near the first and second ends of the first electrode.

5. The device of claim 1, wherein the structured elements are held in position with a conductive curable material.

6. The device of claim 5, further comprising a third electrode and the conductive curable material electrically connects the first and third electrodes together.

7. The device of claim 6, wherein the second and third electrodes are mounted to a substrate.

8. The device of claim 5, wherein the structured elements electrically connect the first and third electrodes together.

9. The device of claim 1, wherein the structured elements are spherical shaped, and the predetermined maximum dimension is a diameter.

10. The device of claim 9, wherein the structured elements are hollow spheres.

11. The device of claim 9, wherein the structured elements are solid spheres.

12. The device of claim 1, wherein the structured elements do not permanently deform under the applied force with an expected range during operation of the device.

13. The device of claim 1, wherein the structured elements comprise a glass material.

14. The device of claim 1, wherein the structured elements comprise a ceramic material.

15. The device of claim 5, wherein the structured elements comprise material that is non-reactive to the processing temperature of the conductive curable material.

16. The device of claim 1, wherein the structured elements have a hardness greater than a hardness of the electrodes.

17. The device of claim 1, wherein the structured elements are electrically conductive.

18. The device of claim 1, wherein the electrodes are electrically coupled through the structured elements.

19. The device of claim 2, wherein the first electrode is positioned between the substrate and the second electrode, and is centered between the structured elements that are positioned near the first and second ends of the first electrode.

20. The device of claim 1, wherein the structured elements are held in position with an adhesive.

21. A method of manufacturing a capacitive device capable of detecting differences in an applied force over a continuous range of applied force including zero force, the device including opposing first and second electrodes spaced apart a predetermined distance when in a rest state, the device having a capacitance controlled by the relative spacing between the first and second electrodes, the method comprising the steps of:

spacing apart the first and second electrodes the predetermined distance with structured elements having a predetermined maximum dimension;

whereby the applied force causes a change in the distance between the first and second electrodes and a related change in the capacitance that can be measured to determine information related to the applied force.

22. The method of claim 21, wherein the first and second electrodes are mounted to a substrate, the first electrode being mounted to the substrate with a connecting material.